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| 09/922,852 | 08/18/2000 | Dariusz Divsalar | 06618/503001/CIT 3057 | 8254 |
| 20985 | 7590 | 05/05/2005 | EXAMINER | |
| FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081 | | | BAKER, STEPHEN M | |
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2133

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/922,852

Applicant(s)

DIVSALAR ET AL

Examiner

Stephen M. Baker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10,13-16,19-22 and 26-68 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6 is/are allowed.
- 6) ☒ Claim(s) 1-5,7-10,13-16,19-22,27-32,34-41,43-50 and 52-68 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-5 and 59-68 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1: "rate close to ones" apparently should be "rate close to one".

In claim 3: "claim 1 said" apparently should be "claim 1 wherein aid".

In claim 59: the decoder apparatus limitation is presented in non-sequitur manner as a non-method step in a method claim.

In claim 61: "said first encoding and interleaving and" apparently should be deleted.

In claims 64 and 65: the transfer function has been deleted without amendment and should be returned.

Claim Rejections - 35 USC § 102

3. Claims 1-5, 7-10, 13-25, 27-32, 34-41, 43-50, 52-66 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,044,116 to Wang (Wang).

Wang discloses an encoding arrangement including a "first encoding" (BIT REPETITION) that "repeats", serially concatenated with an "interleaving" (SECOND

ENCODER INTERLEAVER), serially concatenated with a "second encoding" (SECOND ENCODER). Wang's "second encoding" apparently has a rate $=1$ (Fig. 6), not considering tail bits or puncturing. A corresponding turbo decoder (Fig. 3) performs iterative decoding.

Regarding claim 2, Wang's second constituent encoder (SECOND ENCODER) is apparently a "linear transformation" as it is apparently a convolutional recursive encoder (col. 2, line 4).

Regarding claims 3 and 29, Wang's first constituent encoder (FIRST ENCODER) provides a "middle coder which carries out coding with a rate less than or equal to one", not considering puncturing.

Regarding claim 4, Wang's first constituent encoder (FIRST ENCODER) is a "q,n coder", also considering tail bits.

Regarding claim 5, as Wang's first constituent encoder (FIRST ENCODER) is apparently also a convolutional recursive encoder, it provides a form of "accumulator".

Regarding claims 7, 27, 43, 52, 63 and 65, as g^0 and g^1 are apparently the connection polynomials for Wang's convolutional recursive encoders (FIRST ENCODER, SECOND ENCODER), the polynomial representation "111" as a denominator term apparently corresponds to a transfer function $1/(1+D+D^2)$.

Regarding claim 8, considering the combination of Wang's first and second constituent encoders as the "second encoding", "two accumulators" are apparently provided.

Regarding claims 9 and 10, Wang's first constituent encoder (FIRST ENCODER) provides "at least one additional encoding operation" besides that of the second constituent encoder (SECOND ENCODER).

Regarding claim 13, Wang provides "a plurality of interleaving operations" (SYSTEMATIC INTERLEAVER, FIRST ENCODER INTERLEAVER, SECOND ENCODER INTERLEAVER).

Regarding claims 14 and 31, including Wang's 1:3 splitting junction as a "coder", Wang shows a total of four coders and three interleavers.

Regarding claim 15, Wang further shows a puncturer (PUNCTURE PATTERN) for "puncturing bits, at specified intervals, to chance the effective rate of the inner coder".

Regarding claims 16, 34, 35, 60 and 61, Wang's first and second constituent encoders (FIRST ENCODER, SECOND ENCODER) are "on separate branches of a tree structure", as they are a parallel concatenation.

Regarding claims 18 and 45, Wang's multiple repetition coding can be viewed as a concatenation of "short block codes" that are single repetition codings.

Regarding claim 28, considering the combination of Wang's first and second constituent encoders as the "second encoding", "an accumulator which accumulates twice" is apparently provided.

Regarding claims 30 and 32, Wang's 1:3 splitting junction and second constituent code interleaver apparently constitute "a plurality of said middle coders" and the

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combination of a repetition encoder with a 1:3 splitting junction apparently constitutes "a concatenation of a plurality of short block coders", as applicant apparently defines such.

Regarding claim 39, $k = n$ for Wang's interleaver (SECOND ENCODER INTERLEAVER).

Regarding claims 41 and 49, as Wang's second constituent encoder (SECOND ENCODER) is apparently a convolutional recursive encoder, it provides a form of "accumulator".

Regarding claim 44, considering the combination of Wang's first and second constituent encoders as an "inner coding", "an accumulator which accumulates twice" is apparently provided, and as the rate of both encoders combined is $\frac{1}{2}$, the combination is "substantially rate one" as applicant defines such (p. 5, line 17).

Regarding claim 50, as Wang's second constituent encoder (SECOND ENCODER) is apparently a convolutional recursive encoder, it provides a form of "digital filter with a specified transfer function".

Regarding claim 54, Wang's 1:3 splitting junction and second constituent code interleaver provide "at least one additional coder and at least one interleaver, said additional coder having a rate less than one and coding according to an (n,k) code", where $n=3$ and $k=1$.

Regarding claims 56-58, Wang's constituent coders (FIRST ENCODER, SECOND ENCODER) are linear "accumulators" on separate "branches" and there is no "recurring back or recombining" between "branches" *per se*.

Regarding claim 66, Wang's turbo decoder use "*a posterior(i)*" decoding techniques (Fig. 7).

Claim Rejections - 35 USC § 103

4. Claims 67 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of the publication to Wiberg *et al*, "Codes and Iterative Decoding on General Graphs".

Wang does not discuss the operation of the turbo decoder specifically in terms easily identifiable as a "Tanner graph representation". Wiberg teaches turbo decoder operation in accordance with a Tanner graph representation, which was conventional in the turbo code art at the time the invention was made. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to implement Wang's turbo decoder "by using a Tanner graph representation". Such an implementation would have been obvious because turbo decoder operation in accordance with a Tanner graph representation was already conventional in the turbo code art and taught by Wiberg.

Allowable Subject Matter

5. Claim 6 is allowed.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. Baker whose telephone number is (571) 272-3814. The examiner can normally be reached on Monday-Friday (11:00 AM - 7:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Stephen M. Baker
Primary Examiner
Art Unit 2133

smb